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The Need and Use of Commercial Protein Mineral Supplements in Poultry Feeding

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A COMPLETE or balanced ration for poultry must be so compiled that it contains all the essential proteins, both vegetable and animal, fats, carbohydrates, (starches and sugars), minerals and vitamins to sustain normal healthy growth in young stock, and production, reproduction and health in mature stock. In order to do so these essential food and health ingredients must not only be properly balanced as to the right kinds and the proper proportions, but also as to digestibility and palatability.

On the prairies, wheat, oats, and barley, and occasionally a little corn comprise the grains fed to poultry. In the following discussion all references to carbohydrates are omitted as these grains supply adequate amounts for all needs. On the other hand these grains are low in proteins, minerals and vitamins, and must be supplemented with concentrated forms of these food elements if satisfactory growth, production, and hatchability are to be obtained and the health of the flock maintained. It is the intention in this leaflet to deal with the protein, vitamin, and mineral requirements of poultry, their sources and their uses.

PROTEIN REQUIREMENTS: Minimum for good growth—18% of total feed for 1st 3 months, 16% of total feed from 3 months to maturity.

Lower levels result in less efficient utilization of feed, slower growth, higher cost per pound increase in body weight, poorer feather growth, and more feather picking and cannabalism.

Minimum for production—15% of total feed.
Lower levels result in poor production and small eggs.
Minimum for hatchability—15% of total feed.
Lower levels result in low hatchability.

To be satisfactory, mash mixtures should contain the following percentages of proteins, *one-third of which must be from animal sources.*

Starters—
Turkeys 25%, chickens 20% for all mash feeding to 6 or 8 weeks of age.

Growing Mashes—
Turkeys 20%, chickens 18%.

Laying and Breeding Mashes—
Turkeys 20%, chickens 20%.

Except for the starters, these protein levels permit feeding 50% mash and 50% scratch grains.

VITAMIN REQUIREMENTS:

Vitamin requirements are higher for turkeys than for chickens. The following are the necessary amounts in feed mixtures, and since most of the vitamins come from supplements, the bulk of them are provided through mash mixtures:

REQUIREMENTS:	FOR TURKEYS Units of Vitamin per pound of feed			FOR CHICKENS Units of Vitamin per pound of feed		
	A	D	G	A	D	G
Starters (no scratch)	3600	900	1600	1500	180	1600
Growing Mash (plus scratch)	7200	900	2400	3000	360	2400
Laying Mash (plus scratch)				6300	720	1080
Breeding Mash (plus scratch)	9400	1080	2800	9400	1080	2000

NOTES: For turkeys: Double the amount of vitamin D where the birds are raised in confinement.

For chick and poult mashes: Double the vitamins A and D content and increase the G content to 1800 if scratch grains are fed.

Growing mashes: For Turkeys and chickens based on mash and grain feeding the vitamins A and D content can be reduced slightly if the birds are on good green range and have plenty of sunshine.

The above levels in Laying and Breeders mashes meet all requirements for birds under total confinement when mash is available at all times and scratch grain is fed according to body condition.

MINERAL REQUIREMENTS:

The principal minerals are calcium and phosphorus: These should be in all mashes in the following proportions, which are also the approximate percentages in the mash mixture.

	TURKEYS		CHICKENS	
	Calcium	Phosphorus	Calcium	Phosphorus
Starters	2	1	1.7	0.8
Growing Mashes	2.2	1.2	2.0	1.0
Laying Mashes			2.4	1.0
Breeding Mashes	2.4	1.0	2.4	1.0

Additional needs of calcium for bone and eggshell are supplied through having oyster or clam shell before birds at all times.

Manganese: ¼ to 1 pound in a ton of mash provides adequate amounts for laying and hatchability.

1% iodized salt in mashes supplies the requirements for sodium and chlorine.

Grains being low in the above protein, vitamin and mineral essentials, the following supplements are commonly used to make up deficiencies:

Feed	% Total Protein	Units of Vitamin per lb. of feed			Calcium per 100 lbs.	Phosphorus per 100 lbs.
		A	D	G		
Liver meal	67	50,000	.....	30,000	0.12	0.72
Fish meal (high grade)	67	.....	.....	4,500	5.92	3.96
Meat scrap (high grade)	60	.....	.....	2,700	4.1	2.72
Meat scrap (medium grade)	50	.....	.....	2,700	10.0	5.0
Raw bone meal	24	.....	.....	.....	20.5	15.0
Buttermilk powder	34	.....	.....	11,250	1.36	0.76
Skim milk powder	35	.....	.....	9,000	1.3	1.0
Dried Whey	12.6	.....	.....	11,250	1.46	0.98
Soybean meal	44.0	.....	.....	1,800	0.26	0.66
Linseed Oilcake	36.6	.....	.....	900	0.32	0.9
Cereal grass (dried)	20	60,000	.....	7,200	0.5	0.5
Alfalfa Leaf Meal	17	25,000	.....	5,400	1.42	0.22
Alfalfa Meal	16	15,000	.....	4,500	1.2	0.2
Dried yeast	45	.....	.....	16,000	1.0	1.4
Pilchardene (1)	.....	454,000	90,800	.....	.....	.....
(4 grades (2)	.....	681,000	90,800	.....	.....	.....
obtainable (3)	.....	849,900	181,600	.....	.....	.....
(4)	.....	1,362,000	181,600	.....	.....	.....
Limestone	.....	.....	.....	.....	39.2	.....
Oyster shell	.....	.....	.....	.....	39.2	.....

Compare these with Alberta's grains:

Feed	Average % Protein	Units of vitamin per lb. of feed			Calcium	Phosphorus
		A	D	G		
Wheat	12	.....	.....	225	0.05	0.37
Oats	11	.....	.....	225	0.10	0.4
Barley	11	.....	.....	225	0.05	0.37

Checking these with the requirements shown in earlier tables the need for supplements is apparent, and with this need being stressed at this time, when every effort is being put forth to increase production, commercial protein mineral supplements have become very numerous and very much in demand, so much so, that there is a definite shortage of proteins, particularly the animal proteins.

The following formulae are used with very satisfactory results at the Provincial Poultry Plant.

CHICK STARTER

Ground wheat	30 lbs.
Ground oats	10 lbs.
Ground hulled oats	13 lbs.
Barley	10 lbs.
Bran	10 lbs.
Milk powder	5 lbs.
Fish meal	8 lbs.
Meat meal	5 lbs.
Alfalfa	7 lbs.
Limestone	1 lb.
Salt	½ lb.
Fish oil	½ lb.
Manganese sulphate	4 oz. per ton

CHICK SCRATCH
(To six weeks)

Sized wheat	60 lbs.
Pinhead oatmeal	40 lbs.

GROWING OR DEVELOPING MASH
(Chicken)

Ground wheat	30 lbs.
Ground oats	30 lbs.
Ground barley	15 lbs.
Alfalfa meal	6 lbs.
Meat meal	10 lbs.
Fish meal	4 lbs.
Bone meal	2 lbs.
Fish oil	1 lb.
Salt	1 lb.
Limestone	1 lb.
Manganese sulphate	4 oz. per ton.

Whole oats ad lib.

DEVELOPING SCRATCH
(Six weeks to maturity)

Wheat	30 lbs.
Whole oats	50 lbs.
Barley	20 lbs.

BREEDERS' SCRATCH

Same as Laying Scratch.

TURKEY STARTER
(To eight weeks)

Ground wheat	20 lbs.
Ground oat groats	10 lbs.
Ground whole plump oats	5 lbs.
Ground barley	15 lbs.
Wheat bran	5 lbs.
Alfalfa meal (good quality only)	10 lbs.
Fish meal	12 lbs.
Meat meal (55%)	15 lbs.
Milk powder	5 lbs.
Ground Limestone	1 lb.
Fine salt	1 lb.
Fish oil (400D-3000A)	½ lb.
Manganese sulphate	1 lb. per ton
Riboflavin	4gms. per ton
Potassium iodide	1½ oz. per ton
Choline premix	16 lbs. per ton
Nicotine acid	10 gms. per ton

Chick Scratch to 5 weeks. Developing Scratch after five weeks.

TURKEY DEVELOPING MASH

Wheat	30 lbs.
Oats	20 lbs.
Barley	13 lbs.
Bran	10 lbs.
Meat Scrap	5 lbs.
Fish meal	10 lbs.
Alfalfa	8 lbs.
Limestone	1 lb.
Salt	1 lb.
Bone meal	1 lb.
Fish oil	1 lb.
Manganese sulphate	1 lb. per ton
Riboflavin	1.5 gms. per ton

Whole oats ad lib.

CHICKEN LAYING MASH

Ground wheat	32½ lbs.
Ground oats	25 lbs.
Ground barley	15 lbs.
Fish meal	5 lbs.
Meat meal	12 lbs.
Alfalfa	5 lbs.
Ground limestone	2 lbs.
Iodized salt	1 lb.
Fish oil	½ lb.
Manganese sulphate	4-oz. per ton
Bone meal	2 lbs.

Whole oats and barley fed ad lib. Wheat fed in troughs at night.

LAYING SCRATCH

Wheat	40 lbs.
Whole oats	40 lbs.
Barley	20 lbs.

CHICKEN BREEDERS' MASH

Ground wheat	22 lbs.
Ground oats	20 lbs.
Ground barley	15 lbs.
Whole bran	10 lbs.
Alfalfa meal	7 lbs.
Milk powder	7 lbs.
Fish meal	10 lbs.
Meat meal	5 lbs.
Limestone	2 lbs.
Salt	1 lb.
Fish oil (400D)	1 lb.
Manganese sulphate	8-10 oz. per ton
Riboflavin	1 gm. per ton

OATS ad lib for pullets to be used as breeders.

TURKEY BREEDERS' MASH

Ground wheat	20 lbs.	Bone meal	1 lb.
Ground oats	20 lbs	Salt	1 lb.
Ground barley	17 lbs.	Fish oil (400D)	1 lb.
Whole bran	10 lbs.	Manganese sulphate	1 lb. per ton
Alfalfa meal	10 lbs.	Riboflavin	2 gms. per ton
Milk powder	6 lbs.		
Fish meal	8 lbs.	Feed whole oats in trough at night. Feed wheat only if necessary to maintain body weight of the breeding birds.	
Meat meal	4 lbs.		
Limestone	2 lbs.		

The following points should be noted in making up premixes:

1. Manganese sulphate and salt should not be used in a premix containing high vitamin ingredients such as fish oils.

2. Iodine should not be used in a premix containing manganese sulphate since it is destroyed under these conditions.

It should be noted that the formulae used at the Provincial Poultry Plant with good results contain:

Chick starter	73%	whole grains, 27% supplements.
Developing mash	75%	whole grains, 25% supplements.
Laying mash	72½%	whole grains, 27½% supplements.
Breeding mash	67%	whole grains, 33% supplements.

and for turkeys:

Starter	55%	whole grains, 45% supplements.
Developing mash	73%	whole grains, 27% supplements.
Breeders' mash	67%	whole grains, 33% supplements.

The following table shows the amount of protein in a mash where protein supplements of the per cent. shown are mixed with grains in the proportions shown, and estimating the average protein value of the grains at 11.5%.

	Protein in mash if mixed with grains.				
Protein Supplement	1:3	1:4	1:5	1:6	1:7
35%	17.4%	16.2%	15.4%	14.85%	14.4%
40%	18.6	17.2	16.25	15.6	15.1
45%	19.9	18.2	17.1	16.3	15.7
50%	21.1	19.2	17.6	17.0	16.3

Turn to the table showing protein requirements in mashes, where the ration consists of 50% mash and 50% whole grain, and it will be seen that the more ground grain used in the mash mixture, the less whole grain can be fed, and grinding feeds costs money. As an example, a 50% protein supplement, mixed 1 to 7 with ground grains supplies 15.4% protein in the mash, before any lower protein content whole grains are fed, and 15.4% protein is the bare minimum: i.e., this would require all mash feeding.

The amount of supplements or combinations of supplements to be added to grains will vary with the ingredients used in the supplements, but it can be safely said that one cannot go much beyond a 400 grain to 100 mixed supplement ratio and have optimum results when scratch is fed to maintain body condition.

The percentage of vitamins and minerals in any mixture can be worked out by using the tables in the same manner as was used to show the protein percentages.

As it is practically impossible for a sufficient quantity of fish oil to be incorporated into supplemental feeds without having the supplement go soggy and the oil soak into the bags after a few hours, it is often necessary for the farmers to provide the flock with extra fish oil. The following is the method we recommend in supplying this extra oil. Take the night feeding of whole grain and ½ cupful of oil per 100 birds. Warm the grain and the oil and mix thoroughly. Feed in troughs and be sure that there is plenty of space for all birds to feed. Feed every other night for four feeds. Repeat every three or four weeks. Where colds show up or where weak shells are above normal double the amount of oil given, and also add an extra 4% of Alfalfa Leaf Meal until the trouble has been overcome.

Poultry can utilize proteins to better advantage than can any other live stock on the farm. With the definite scarcity of animal proteins poultry farmers should utilize as much home grown proteins as possible such as milk, good quality alfalfa hay, dried grasses, etc., especially with their growing birds and during the breeding season. Care should be exercised in the feeding of alfalfa and grasses to the laying flocks, as an excess of greens will produce a yolk color too dark for eggs of Grade A. Where oilcake meal or soybean meal are available at prices that correspond to the per cent. protein value these can replace meat scrap or fish meals to the extent of one-third to one-half of the protein requirements for poultry.